Abrahamson & Silva 2012 GMPE

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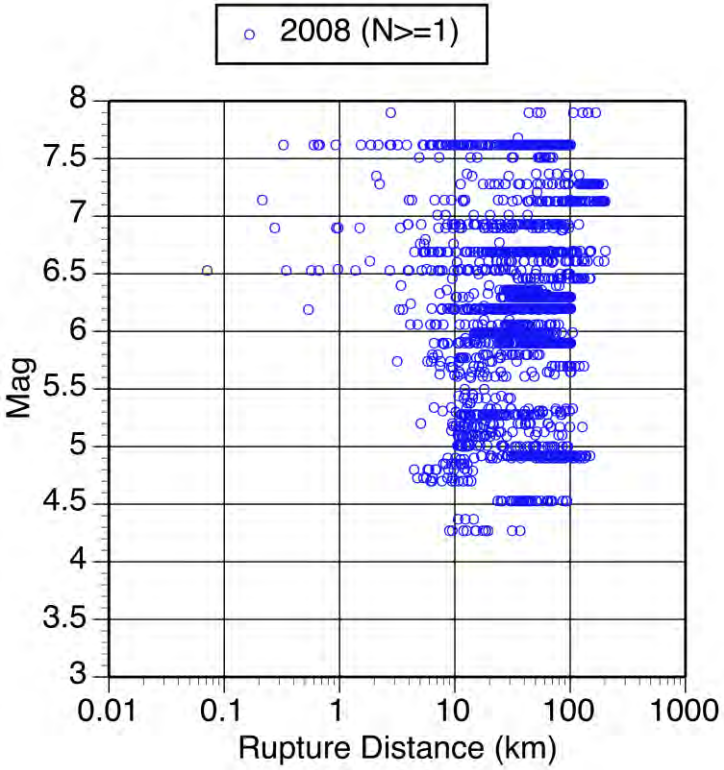
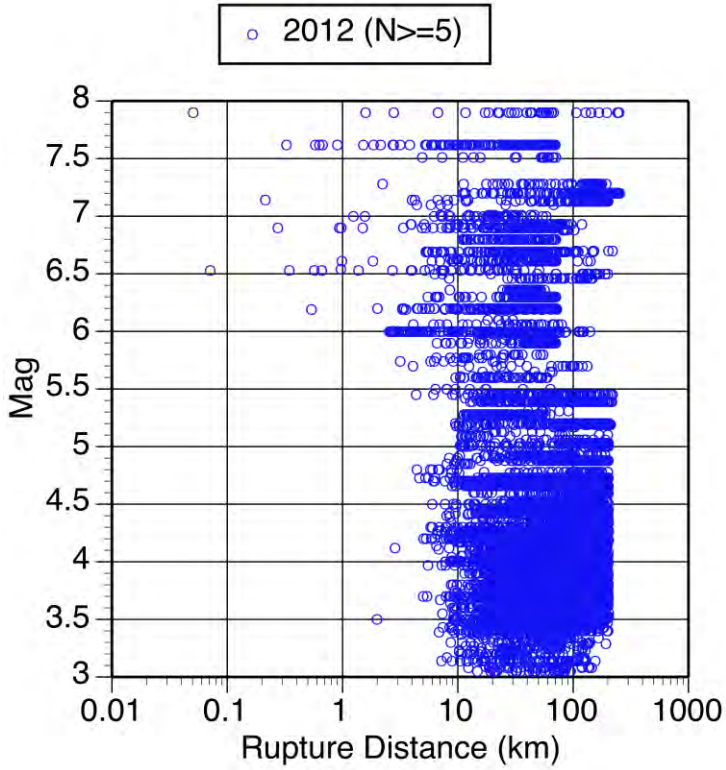
Data Set

- Exclude Italy and Wenchuan Aftershocks
  - Need more review of the meta data
- Include other class 2 events
- Included Wenchuan mainshock, but may have strong regional site effects


2008 (N>=1)
Mag
Rupture Distance (km)
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
0.01
0.1
1
10
100
1000


2012 (N>=5)
Mag
Rupture Distance (km)
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
0.01
0.1
1
10
100
1000

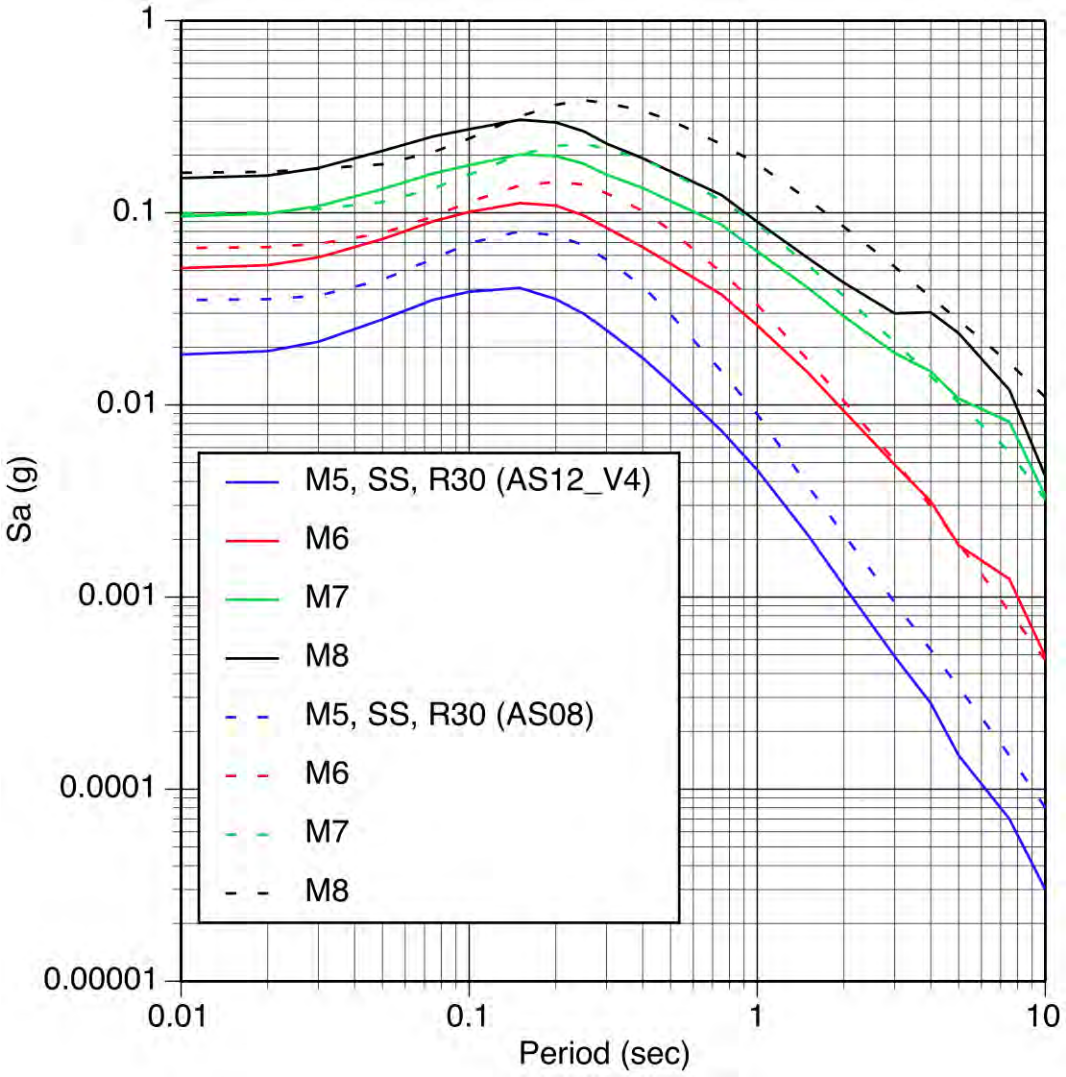
Key Changes from AS08

- Extended to lower magnitudes
  - Strong break in mag scaling below M5
- Scaling with ZTOR
  - Scaling from 0-20 km, (rather than 0-10 km in AS08)
  - More data at ZTOR> 10 km
- Large distance attenuation
  - AS08 used 0-100 for all regions, and 0-200 for WUS
  - AS12 uses 0-70 for all regions, and 0-250 for WUS
- Site Term
  - AS08 used single VS30 scaling for all regions
  - AS12 includes regional differences for Taiwan and Japan

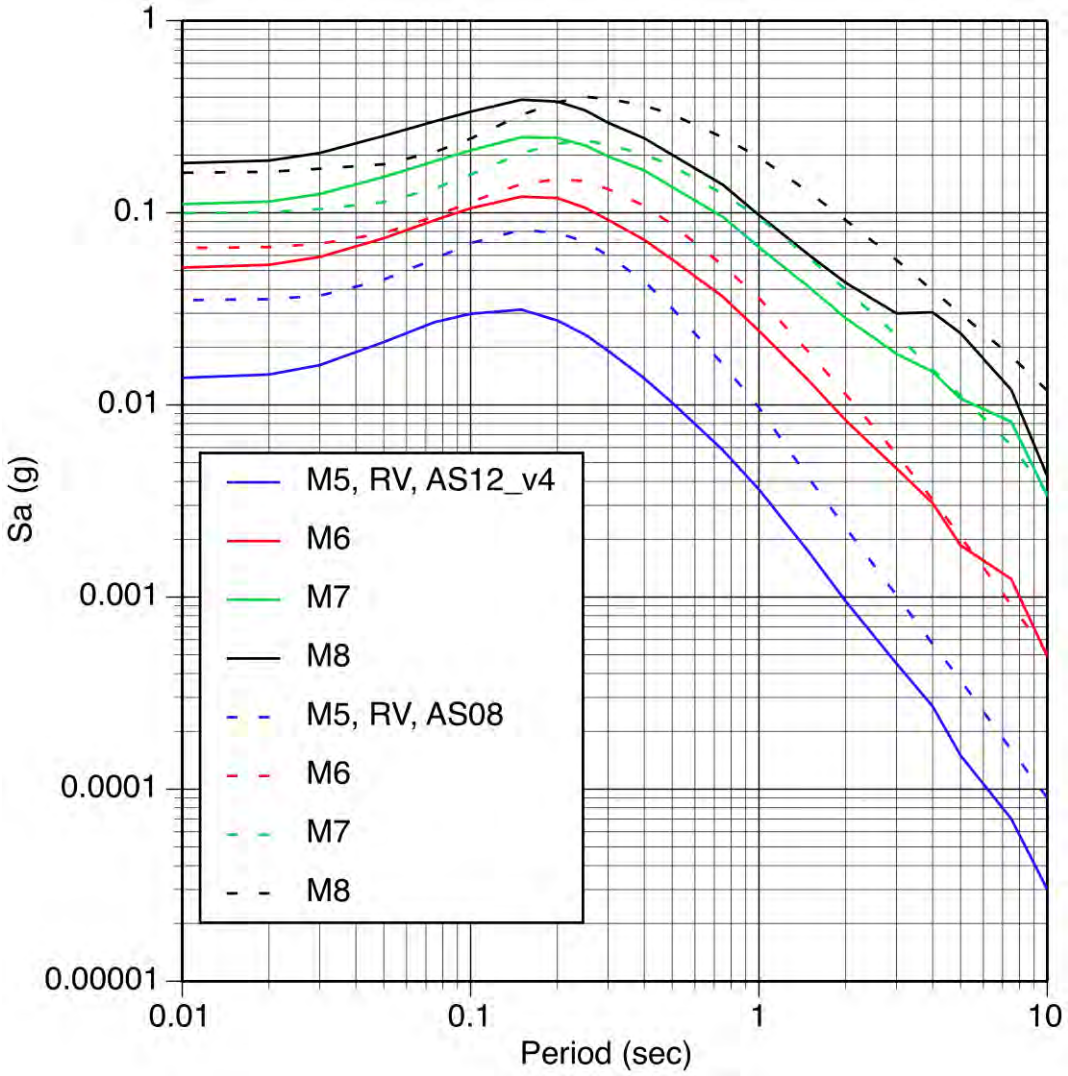
Key Changes from AS08

- Non-linear model
  - Use SA not PGA as level of shaking (Kamai model)
  - Need to compare with other models
- Improved constraint on HW tapers
  - Remain limited (5) earthquakes with good FW/HW data
  - Used numerical simulations to constrain scaling of HW with dip, mag, dist, ZTOR (Donahue model)

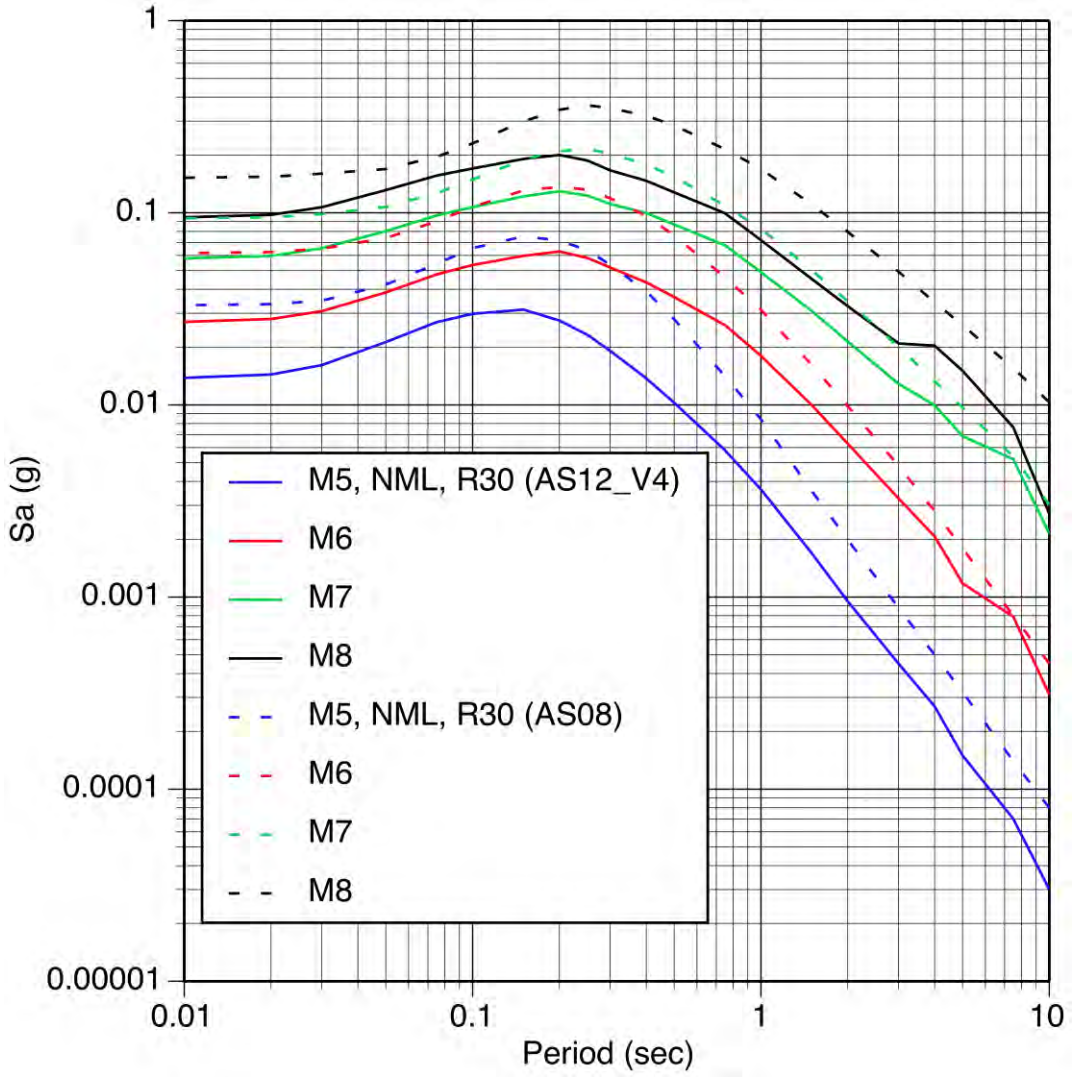
SS, R=30, 760 m/s


1
0.1
0.01
0.001
0.0001
0.00001
Sa (g)
0.01
0.1
1
10
Period (sec)
M5, SS, R30 (AS12_V4)
M6
M7
M8
M5, SS, R30 (AS08)
M6
M7
M8

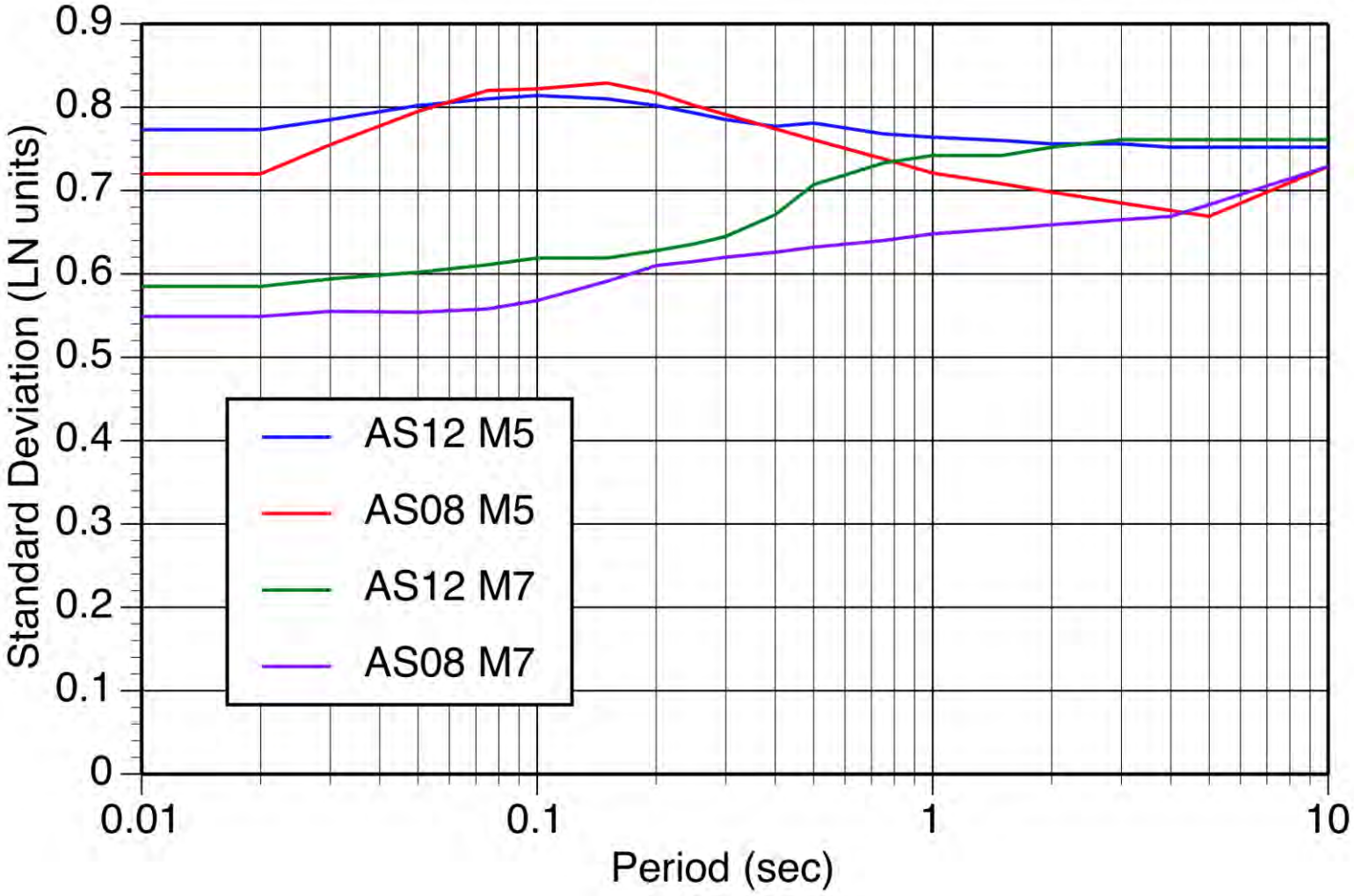
REV, (FW), R30


1
0.1
0.01
0.001
0.0001
0.00001
Sa (g)
0.01
0.1
1
10
Period (sec)
M5, RV, AS12_v4
M6
M7
M8
M5, RV, AS08
M6
M7
M8

NML, FW, R30


1
0.1
0.01
0.001
0.0001
0.00001
Sa (g)
0.01
0.1
1
10
Period (sec)
M5, NML, R30 (AS12_V4)
M6
M7
M8
M5, NML, R30 (AS08)
M6
M7
M8

Sigma Comparison for VS30=760 (Linear sigma)



Still to be Done

- Include the aftershocks from Italy and China after further checks on meta data. Update the class two term. The current model for class 2 is adopted from Wooddell and Abrahamson (2012)
- Include a kappa scaling term for sites with VS30> 500 m/s with default kappa values for a given VS30.
- Include a single-station sigma model.
- Include regionalization of the Q term for regions other than CA.
- Develop a parametric VS30 form for the Japanese sites. Current model is non-parametric for Japan.
- Update the soil depth term based on the new basin model from SCEC and new shallow site simulations.
- Revise long period (T>1 sec) scaling for M>7 .
- Add constant spectral displacement constraint at long periods
- Add directivity as a (M,R) dependent sigma

Use in National Maps

- Before Use in NSHM
  - Complete model (Jan 2013)
  - Understand differences with other NGA-west2 models
    - Key benefit of the NGA process is comparison between models as they are developed
  - Complete documentation
    - Due in Jan 2013 as PEER report
  - Trial PSHA application of all NGA-west2 models at several representative sites in CA
    - Detailed comparisons of hazard curves and deaggregation
    - Understand differences
    - Models should be well tested before use in National Maps